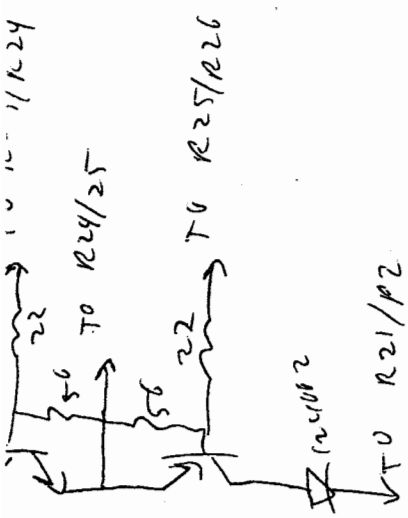
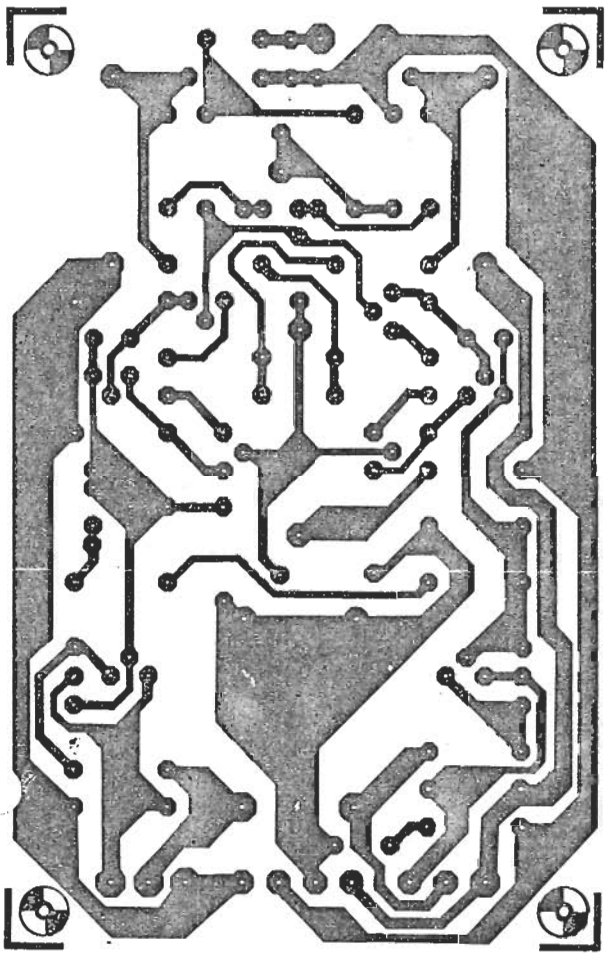
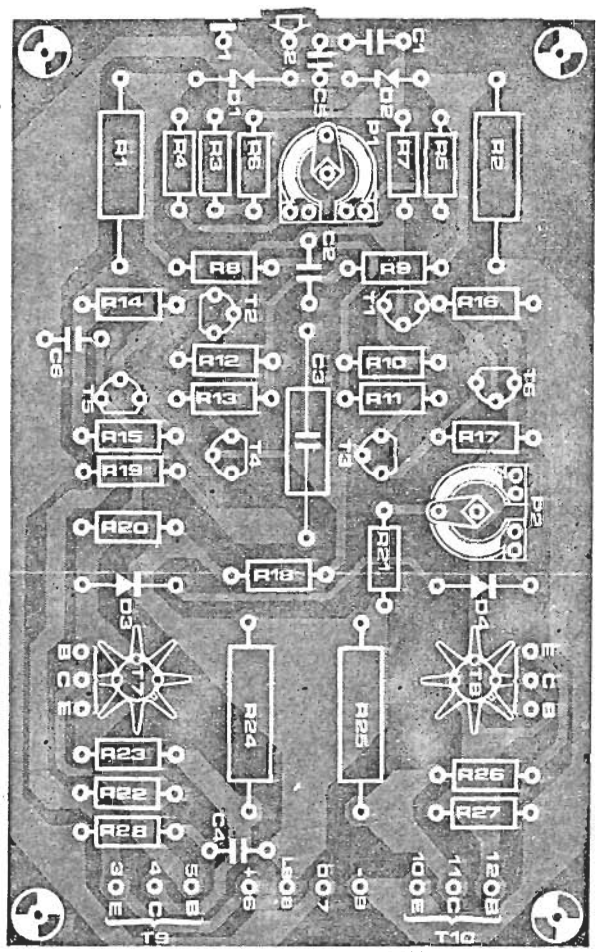
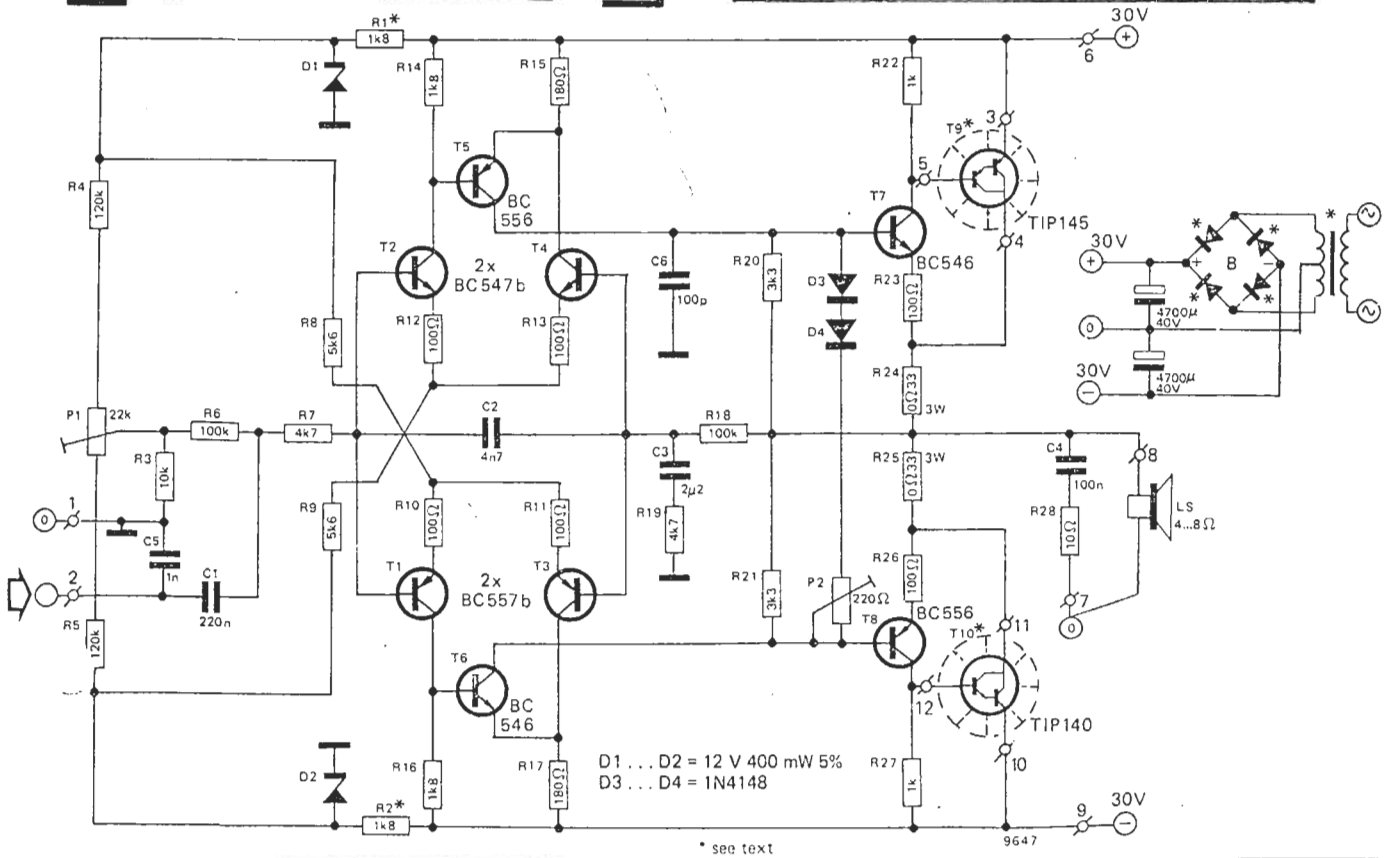


89 This class B amplifier has a few characteristics that makes it stand out from the crowd.
For one thing, not only is the final stage symmetrical and complementary, but all of the other stages are as well. The differential input stage requires an extra outlay of about 40 p, when compared with an asymmetrical preamplifier stage. The balanced design abolishes the need of expensive (and unreliable) coupling and decoupling capacitors. The loudspeaker connects straight to the final stage.
Switching phenomena are inaudible. The required frequency compensation is accomplished in such a way that transient intermodulation distortion is eliminated. This was more fully described on page 452 of the April 1976 issue of Elektor (nr. 12).
To make sure that the amplifier is st[illegible] the open loop gain must roll o[illegible] 6 dB/oct above the break frequency f_0. In conventional circuits this would mean the driving signal would have to increase at frequencies above f_0, also at 6 dB/oct. Under those conditions the driving signal at higher frequencies could rise to such a level that clipping would occur. This design features a network composed of the output impedance of the preceding amplifier in series with R7 plus C2 and R18/R19. The signal across C2 is the effective signal driving the amplifier; its level decreases as its frequency rises above f_0.
The amplifier is of universal design, both in theory and in practice. This leaves plenty of scope for the do-it-yourself constructor. A few examples follow.
1. Omission of R20 and R21 causes the final stage to function as a balanced current controlled circuit.
2. Open loop gain and DC adjustment of all stages are practically independent of the balanced power voltages, provided zeners D1 and D2 always draw a current of approximately 10 mA. The printed circuit board will accommodate the half watt resistors R1 and R2.
3. The T9/T10 transistors can be either complementary darlington pairs or discrete complementary power transistors. Components R22, R27, R14 . . . R17 and T5 . . . T10 must be chosen in accordance with the requirements of the other active elements in the circuit. Unfortunately, limited space prohibits full discussion of all possibilities.
The complete amplifier when powered by a balanced plus and minus 30 V source, will have an output of at least 40 W into an 8 ohm load, with a harmonic distortion of approximately 0.05% at 1 kHz. The gain is about 22.
Some construction tips:
1. The PNP darlington (T9) can be chosen from the following selection: TIP 145 (60 V), TIP 146 (80 V), TIP 147 (100 V) and similar types; the NPN (T10) from TIP 140 (60 V), TIP 141 (80 V), TIP 142 (100 V) and the like. T9 and T10 can have a common sink with a 2°C/W thermal resistance.
2. Control P2 adjusts the quiescent current of the final stage to 25...50 mA. The exact adjustment procedure is described on page 530 of the May '76 issue of Elektor (nr. 13).
3. Zero offset control, P1, balances the amplifier output terminal (the R25/R24 junction) in the absence of an input signal. This adjustment requires a universal meter with a low DC millivolt range. The balancing effectiveness can be verified by reversing the meter polarity. It is recommended to verify the offset balance again when P2 has been re-adjusted.
4. Capacitor C3 must be bipolar, *not* an electrolytic.
5. The 2 x 24 V centre tapped power transformer and bridge rectifier must be capable of supplying 2 . . . 3 A.






R1* 1k8
D1
R14 1k8
R15 180Ω
R22 1k
30V
6
T5
BC 556
T9* 3
5
T7
BC546
TIP145
4
T2
2x
BC547b
T4
C6 100p
R20 3k3
D3
D4
R23 100Ω
R24 330Ω 3W
30V
4700µ 40V
0
30V
4700µ 40V
R4 120k
R8 5k6
R12 100Ω
R13 100Ω
P1 22k
R6 100k
R7 4k7
C2 4n7
R18 100k
R3 10k
C3 2µ2
R19 4k7
R25 3W
C4 100n
8
LS 4...8Ω
R28 10Ω
7
1
C5 1n
C1 220n
2
R5 120k
R9 5k6
R10 100Ω
R11 100Ω
T1
2x
BC557b
T3
R21 3k3
P2 220Ω
R26 100Ω
T8
BC556
T10* 11
T6
BC 546
12
TIP140
10
D1 . . . D2 = 12 V 400 mW 5%
D3 . . . D4 = 1N4148
D2
R16 1k8
R17 180Ω
R27 1k
R2* 1k8
9
30V
9647
* see text